MATERNAL & CHILD HEALTH
EPIDEMIOLOGY
NEW JERSEY DEPARTMENT OF HEALTH

CESAREAN DELIVERY: COMPARING NEW JERSEY HOSPITALS, 2011

Synopsis for graphical data updates.

The Maternal and Child Health Epidemiology Program within the Department of Health and Senior Services systematically monitors cesarean delivery and associated perinatal health issues. (http://nj.gov/health/fhs/professional/safequality.shtml) Hospital-specific data on cesarean delivery are now publicly available. Comparisons between hospitals can be useful both for assessing clinical practice and for informing individual choices.

Cesarean delivery of live-born infants has been on the rise for a decade in New Jersey, and the elective and non-elective use of this surgical procedure has been controversial for much longer. In this regard, New Jersey is at the front of a wave sweeping the whole country. The national cesarean delivery rate has increased from 21% in 1996 to 32% in 2008. States neighboring New Jersey also have higher-than-average rates.

Reasons for these trends are not clear. Cesareans increased most among women who: had mild complications with previously low risk of cesarean delivery; had a cesarean for an earlier child; or whose labor was induced artificially. The majority of cesareans in each category might be considered discretionary and avoidable. New Jersey's recent trends are strongly influenced by hospital and clinician practice.

APPROACH

To make valid comparisons between hospitals, statistical measures should be clinically comparable, directly predictive and reliable. Because each hospital has a different mix of patients, a simple percentage of all cesareans out of all births does not meet these criteria. We therefore use a more refined approach.

***The most common obstetric categories are analyzed separately*.** We refer to singleton pregnancies delivering after 37 weeks of pregnancy with the baby's head down as *standard presentations*. In 2010, they accounted for 86% of births and 76% of cesareans. We divide them into three groups: *first-time moms*, *repeat moms* (with no previous cesareans) and

repeat cesareans/VBACs (vaginal birth after previous cesarean). Average rates of cesarean delivery are very different in these groups— 35%, 11% and 92%, respectively.

Some medical conditions clearly indicate a necessary cesarean. The following conditions can be diagnosed objectively prior to *trial of labor* (see below): severe uterine bleeding, uterine tissue anomaly, severe hypertension, preeclampsia, eclampsia, fetal growth restriction (measured after the fact by birthweight less than 10th percentile for gestational age), excessive fetal growth (birthweight greater than 90th percentile for gestational age). Cesarean delivery is standard practice in such cases to protect the health of mother and baby, and so we exclude all such cases from statistics here.

Cesarean with and without trial of labor are different. Cesarean without labor has, in every obstetric category listed above, grown much faster than cesarean after a trial of labor. Each represents an entirely different decision process with its own benefits. Safety issues for mother and baby are also somewhat different. It is therefore important to monitor these two variations separately.

Comparing cesarean rates within specific medical categories is important in considering the choices and risks relevant to an individual mother. Even within these categories, outcomes in individual hospitals vary substantially. For example, in 2010:

History	***Range of Hospital Cesarean Rates (from 10th to 90th percentile)***	
	Without trial of labor	***After trial of labor***
First live birth	5-15%	18-30%
All prior deliveries vaginal	2-10%	3-7%
Any prior cesarean delivery	76-97%	14-67%

In previous years, our analysis of variations in hospital cesarean outcomes included less common obstetric categories, such as multiple gestations. Beginning in 2010, we have chosen a sharper focus over past years' comprehensiveness. Since 2007 we have constructed a *risk-adjusted* index for each hospital that allowed overall comparisons in spite of patient mix; that index is tabulated below. Other data items reported from 2007 and 2009 are still available by request.

MEASURES

The accompanying graphs represent the following calculations:

Table 1: Cesarean Deliveries to First-time Mothers.		
Selection: no previous live birth; singleton, 37+ weeks gestation, head-down position; indicator negative for uterine bleeding, chronic hypertension, preeclampsia, eclampsia; birthweight at least 10th percentile for gestational age, and at most 90th percentile for gestational age		
measure	*numerator*	*denominator*
Cesarean, no labor	Cesarean indicator=yes and trial of labor=no	All live births in selection
Cesarean, after labor	Cesarean indicator=yes and trial of labor=yes	All live births in selection
Table 2: Cesarean Deliveries to Repeat Mothers.		
Selection: 1+ previous live birth; singleton, 37+ weeks gestation, head-down position; no prior cesareanindicator negative for uterine bleeding, chronic hypertension, preeclampsia, eclampsia; birthweight at least 10th percentile for gestational age, and at most 90th percentile for gestational age		
measure	*numerator*	*denominator*
Cesarean, no labor	Cesarean indicator=yes and trial of labor=no	All live births in selection
Cesarean, after labor	Cesarean indicator=yes and trial of labor=yes	All live births in selection
Table 3: Labor Induction and Cesarean Delivery.		
Selection: no previous cesarean; singleton, 37+ weeks gestation, head-down position; indicator negative for uterine bleeding, chronic hypertension, preeclampsia, eclampsia; birthweight at least 10th percentile for gestational age, and at most 90th percentile for gestational age		
measure	*numerator*	*denominator*
Cesarean, first-time mom	Cesarean indicator=yes and induction of labor=yes	No previous live births and induction of labor=yes
Cesarean, repeat mom	Cesarean indicator=yes and induction of labor=yes	1+ previous live births and induction of labor=yes
Table 4: Repeat Cesarean Delivery and VBAC.		
Selection: previous live birth by cesarean; singleton, 37+ weeks gestation, head-down position; indicator negative for uterine bleeding, chronic hypertension, preeclampsia, eclampsia; birthweight at least 10th percentile for gestational age, and at most 90th percentile for gestational age		
measure	*numerator*	*denominator*
Repeat Cesarean, no labor	Cesarean indicator=yes and trial of labor=no	All live births in selection
Repeat Cesarean, after labor	Cesarean indicator=yes and trial of labor=yes	Trial of labor=yes and 39+ weeks gestation. Minimum 10 trials to report

Note: hospitals in each graph are sorted by the overall risk-adjusted cesarean index, from lowest to highest. Index is the weighted average of cesarean rates in the three major obstetric categories (first-time mom, repeat mom without cesarean, repeat cesarean) using the statewide distribution of births in these three categories from 2011.

	births	index
North Jersey		
Univeristy of Medicine & Dentistry of New Jersey - University Hospital	1,002	0.25
Palisades Medical Center - New York Presbyterian Heathcare System	989	0.28
Englewood Hospital and Medical Center	1,503	0.29
Saint Barnabas Medical Center	3,698	0.33
Clara Maass Medical Center	1,200	0.33
The Mountainside Hospital	734	0.33
Newark Beth Israel Medical Center	2,121	0.34
The Valley Hospital	2,057	0.35
St. Joseph's Regional Medical Center	2,197	0.35
Hoboken University Medical Center	1,055	0.36
Holy Name University Medical Center	967	0.36
Liberty HealthCare System, Inc. - Jersey City Medical Center	1,060	0.37
Hackensack University Medical Center	4,313	0.41
Christ Hospital	953	0.43
St. Mary's Hospital Passaic	757	0.44
Liberty HealthCare System, Inc. - Meadowlands Hospital Medical Center	446	0.48
Northwest and Central Jersey		
Trinitas Hospital	1,586	0.27
Capital Health Medical Center - Mercer (Hopewell)	1,337	0.29
Morristown Memorial Hospital	2,778	0.30
Robert Wood Johnson University Hospital	1,473	0.30
Newton Memorial Hospital	403	0.30
RWJ University Hospital at Hamilton	884	0.30
Raritan Bay Medical Center	909	0.31
University Medical Center at Princeton	1,389	0.31
Chilton Memorial Hospital	660	0.32
Saint Peter's University Hospital	3,654	0.33
Overlook Hospital	1,680	0.33
Saint Clare's Hospital/Denville	972	0.34
Hunterdon Medical Center	764	0.34
Somerset Medical Center	774	0.34
JFK Medical Center	1,842	0.35
Hackettstown Community Hospital	339	0.35

	births	index
South Jersey and Shore		
Monmouth Medical Center	3,166	0.22
The Cooper Health System	1,306	0.24
Kimball Medical Center	751	0.25
South Jersey - Elmer	251	0.27
Our Lady of Lourdes Medical Center	707	0.29
Meridian Health - Ocean Medical Center	753	0.30
Kennedy University Hospital- Washington Township	824	0.31
Underwood Memorial Hospital	650	0.33
Meridian Health - Jersey Shore	1,276	0.33
Cape Regional Medical Center	374	0.34
South Jersey Regional Medical Center- Vineland	1,388	0.34
CentraState Healthcare System	1,102	0.36
AtlantiCare Regional Medical Center- Mainland Division	1,671	0.36
Community Medical Center	1,118	0.36
Shore Memorial Hospital	813	0.36
Meridian Health - Riverview Medical Center	1,042	0.37
The Memorial Hospital of Salem County, Inc.	119	0.37
Meridian Health - Southern Ocean Medical Center	260	0.38
Virtua West Jersey Hospital - Voorhees	3,844	0.38
Virtua Memorial Hospital of Burlington County	1,911	0.39